1. **Research hypotheses and objectives of the project**

The youth labour market situation represents an important challenge for policy makers around the world as reflected by the prominence in the Millennium Development Goals (1) and the fact that promoting youth employment represents an explicit target in the sustainable development goals (2). The youth labour market situation has even gained urgency as it deteriorated dramatically in the wake of the recent global crisis as evidenced by the increase of the youth unemployment rate to 13% in 2016 (3). While youth unemployment plays a smaller role in low income countries, youth suffers from underemployment, low job quality and income. Moreover, low national youth unemployment rates in low and middle income countries often hides high youth unemployment of educated young people in urban areas (4). While youth unemployment and underemployment are an immediate economic as well as political and social challenge, the youth labour market situation also has long-term consequences: neglecting the situation of today’s youth has long-lasting negative consequences on education, economic situation, family formation and citizenship (1). Therefore, failing to invest into the human capital of youth hampers long-term growth perspectives of countries. This matters particularly in low income countries, where youth represents about one third of the population (5). The so-called demographic dividend, an increase in the economic growth rate as the working age population grows relative to the total population, will not be realized in countries where not enough is invested in the large and growing numbers of young people (4, 6). Hence, improving gainful employment, job quality and income of youth is necessary to unlock economic growth potentials which in turn might have a positive impact on the labour market situation of adults in the future. However, it is important to keep in mind that improving living standards of youth does not automatically increase national labour productivity and social cohesion (e.g. 7).

Technical Vocational Education and Training (TVET), which prepares students for labour market entry (8, 9), “is often seen as the silver bullet to the problem of youth joblessness” (10). However, this expectation is clearly over-optimistic, as the youth labour market situation depends on general labour demand, which in turn depends on thriving economy. In these contexts, the research project explores the different dimensions that facilitates TVET to contribute to improve the youth labour market situation.

Our main hypothesis is that the success of TVET to improve young people’s chances of gainful employment and increased income depends on the social institutions of TVET (11, 12, 17), where social institutions refer to complex social forms that reproduce themselves and influence actors choices in education and employment systems (175). The neo-institutional theory distinguishes between three pillars of institutions (176). The regulative pillar consists of legally sanctioned rules. The normative pillar governs through social obligation and the cultural-cognitive pillar refers to aspects of institutions that are taken for granted. However, the definition of social institutions in the context of TVET remains an unresolved issue and must be clarified.

Theory suggests that education-employment linkage is a key for the success of TVET in improving labour market outcomes of the youth as it determines how well TVET curricula will fit local labour market needs (e.g. 13, 14, 15, 16, 17, 116). Linkage refers to institutionalized and observable communication between actors from the education and employment systems throughout the chain of education processes influenced.
by social institutions and which leads to an equilibrium of decision power. This view is supported by reports suggesting that a lack of education-employment linkage represents a problem in many low and medium income countries (e.g. 18, 19). Hence, this research project aims to contribute to a reduction in youth poverty by improving linkages between the actors of the education and employment systems through better aligned social institutions. Therefore, the overarching research question of this project is:

**Q0: Under what conditions can TVET reduce unemployment, improve gainful employment, job quality, and thus income of the youth?**

In order to answer our overarching research question, we need answers to the following specific questions:

**Q1: How can we define and measure social institutions of TVET?**

**Q2: How can we measure the youth labour market situation in low and middle income countries?**

**Q3: Does improving the linkage between the actors of the education and employment system reduce unemployment, improve gainful employment, job quality, and thus income of the youth?**

**Q4: How can the implementation and continuation of systemic changes in TVET be enhanced?**

The following paragraphs discuss the sub-questions analysed in the context of each of these four main questions in detail, clarifying that the research project uses an interdisciplinary approach that draws from sociology, educational science and economics:

**Q1: How can we define and measure social institutions of TVET?**

In order to measure social institutions of TVET systems, we are building on the theoretical framework of the **social systems theory** (20, 21), which defines social systems as actions of multiple persons that are related to each other in a meaningful way, thereby allowing to differentiate the system in its interaction from the environment. Consequently, each system aims to fulfill a particular function in society (22). Each system consists of a closed self-referential part called encoding and a reciprocal part called programming (23). Encoding defines the communication code, which consists e.g. of the wage in the employment system as a result of the programming of labour demand and supply. For the education system, encoding refers to either passing or failing as organized by the programming of curricula.

In TVET the functional differentiation of the society has far-reaching consequences because of the interrelation of the systems. If the encoding and programming of the systems are not aligned and linked, coordination and control problems will arise with regard to specific performance outcomes, e.g. skills mismatch (17). This observation connects system theory to curriculum theory, which concerns the definition and development of curricula (24, 25, 26). In other words, defining and developing a curriculum of the TVET system that fails to account for the coding of the employment system results in suboptimal outcomes.

The first step of the research project is developing a theoretical and empirical framework for assessing social institutions of TVET, hence, to investigate how to measure coordination and control problems. The literature distinguishes three forms of education, though the distinction between these terms depends on the country-specific context and hence remains fluid and disputed in the literature: formal,
**non-formal and informal education** (e.g. 27, 28, 29, 30). Unlike formal and non-formal education, informal education has other norms. For example, informal education is non-intentional and non-structured. While formal education leads to a recognised qualification by the state, non-formal education is not part of the state initial education system, and is delivered by educational providers, companies, social partnership organisations and public-benefit bodies (30). Non-formal TVET and informal education play a particularly important role in human capital formation in low income countries (31, 32, 33, 34, 35). However, formal education degrees and credentials open the career ladder within the education system and hence, make formal education degrees attractive.

These descriptions highlight that social institutions of TVET in terms of the regulative, normative and cultural-cognitive pillars represent a crucial dimension of the TVET system as these social institutions govern the **involved actors**, their roles, and their relationships with each other. Figure 1 visualizes four actor types of the TVET system that are linked through the social institutions of TVET. Mapping the actors, their roles and the three pillars of social institutions in formal, non-formal and informal education will be part of the first phase of the study. Actor types can include the government, formal or non-formal education providers, including foreign NGOs, and formal and informal companies. Intermediary institutions can also participate in TVET, ranging from non-formal clans to guilds and on to non-formal and formal industry associations and trade unions.

**Figure 1: Social institutions in the TVET system**

![Diagram of social institutions in the TVET system]

Theory suggests that education-employment linkage moderated by a specific composition of social institutions is a key element, partly as it determines how well TVET curricula will fit local labour market needs (e.g. 13, 14, 15, 16, 17). As a working hypothesis, Figure 2 displays a schematic **theoretical concept of education-employment linkage**, which we define as an equilibrium of decision power between actors from the education and employment systems in TVET processes. The horizontal axis starts at a situation in which education system actors have all the decision power and linkage is low. The blue labels show that an example consists of a fully school-based system without input from employers. Education-employment linkage reaches its highest point when actors from the education and employment systems are highly linked and share decision power optimally, collaborating to design, apply, and update TVET. Dual TVET, which combines formal education in school with curriculum-guided workplace training, represents an example of such an optimal linkage. If the employment system becomes more powerful, beyond the optimum, linkage starts to decrease and TVET moves toward an on-the-job training model in which no explicit link to the programming (curriculum) and encoding (passing/failing of exam) of the education system is included.
The lower part of Figure 2 further clarifies that the strategy to improve linkage depends upon the social institution setting: If the employment system has too much decision power, improving linkage requires an appropriate formalization strategy that recognizes TVET education by introducing programming and encoding of the education system (e.g. exams/assessments) and increases involvement from education system actors. Formalization, in the strict sense discussed above, can be defined as recognition by appropriate education ministry on the governmental level (27, 28). From a functional perspective, formalization can be viewed as an enlargement in the scope of recognition: training recognition from a guild is more formal than recognition from a family, and so on to the national level of government recognition (e.g., 36). Since breadth of recognition also depends on the specificity of skills, a formalization strategy also entails increasing general education relative to specific skills training and consequently raising the share of classroom education compared to work-based training. This is particularly relevant as it represents a necessary step towards creating pathways towards and within the formal education system.

On the other end of the education-employment linkage curve, in which the education system has too much decision power, we hypothesize that the youth labour market situation can be improved by an appropriate labour market alignment strategy. By increasing the involvement and decision power of actors from the employment system, this strategy improves the youth labour market situation by reducing the skills mismatch, which is an imbalance between skills offered and skills demanded on the labour market (e.g. 37). However, since the existing literature provides little guidance regarding the specific processes and social institutions that link the actors from the education and employment system along the education process, this research project will explore the potential forms taken by the labour market alignment strategy.

In order to develop a conceptual framework of social institutions in the TVET system, we build upon the KOF Education-Employment Linkage Index (KOF EELI, 38), which is based on the social system theory (21, 20) and follows the theoretical framework of the Curriculum Value Chain (CVC, 39) shown in Figure 3. The CVC distinguishes between three phases of an educational process. First, the curriculum design phase defines educational goals and competences along with a corresponding
curriculum. Second, the curriculum application phase captures the application of the curriculum which is experienced by the students in a certain environment. Labour market outcomes can be measured after this phase. Third, the analysis of outcomes re-enter curriculum design in the curriculum feedback phase.

Figure 3: Curriculum Value Chain Framework

Education-employment linkage can be measured using the KOF Education-Employment Linkage Index (38, further referred to as KOF EELI). However, the index only focuses on assessing education-employment linkage of formal education systems in high income countries under a specific composition of social institutions. In order to apply this conceptual approach to capture formalization strategies in low income countries and fully address the first question, Q1, we need to answer the following sub-questions:

SQ1a: How can we measure the linkage between actors from the education and employment systems of formal TVET in low and middle income countries?

SQ1b: How do social institutions differ between formal, non-formal and informal TVET?

SQ1c: How can informal TVET be formalized and integrated into the formal education system without harming well-established procedures of informal education?

SQ1d: What are the incentives, conditions and social institutions under which employment system actors can be integrated into the education processes of purely school-based TVET systems?

The second step necessary to test our overall hypothesis is to define gainful employment and the appropriate measurement of the youth labour market situation:

Q2: How can we measure the youth labour market situation in low and middle income countries?

The youth labour market situation is more complex than traditional statistics like youth unemployment can capture. We have started to address this problem to some extent in OECD countries with the KOF Youth Labour Market Index (KOF YLMI, 40), which includes for example measures for involuntary part-time working, temporary working contracts, vulnerable employment and education activities apart from youth unemployment rates. However, the KOF YLMI does not fully address the situation of young people in low and middle income countries for at least two reasons: first, the necessary data is not always available or only infrequently, and second, existing data might not capture the situation in the
formal and informal sectors. Hence, this research project develops and implements a youth survey to answer the following sub-questions:

SQ2a: How can we define and measure gainful employment and job quality appropriately in low and middle income countries for the youth, given both formal and informal employment?

SQ2b: How can we measure skills mismatch in low and middle income countries, where a large share of both education and employment happen in non-formal and informal settings?

SQ2c: How does the youth labour market situation differ across groups, e.g. between men and women, between formal and informal employment, between urban migrants and urban born, etc.?

SQ2d: How can we exploit mobile phone technology to implement youth surveys cost-effectively and more frequently?

SQ2e: What is an appropriate definition of “youth”? Does the international definition 15-24 years as proposed and used by the ILO reflect the “youth” in low-income countries?

The first question deals with measuring the labour market situation of the youth in terms of the quantitative and qualitative situation, including skills mismatch, in a way that allows for and includes both formal and informal employment. Young people might be employed in high-quality jobs in the informal sector, and failing to measure their outcomes ignores the reality of work in low and middle income countries. We will build on the KOF Youth Labour Market Index on the one side (which a focus on youth) and the comprehensive literature on informal employment on the other side (which mostly does not specifically address the situation of the youth). The second question addresses the issue of measuring skills mismatch, an unresolved issue (e.g. 37), particularly for low income countries due to a lack of data and the prevalence of non-formal and informal education and employment. The third question analyses how the youth labour market situation differs across sub-populations. The distinction between men and women represents a particularly relevant dimension for low and middle income countries, as women face substantial barriers to enter TVET (41). This issue is aggravated by the prevalence of informal education and employment, which perpetuates discrimination and traditional norms (42, 43). Fourth, low and middle income countries conduct household and labour force surveys irregularly due to high implementation costs, limiting available data for policy makers. Hence, we explore the possibility of reducing survey costs by exploiting mobile phone technology. A last challenge consists of defining an appropriate age range to measure youth, which can be defined as the period of transition from childhood dependency to adult independence (44). Since this definition of youth refers to a stage in life rather than to an age range (1, 45), empirical age range associated with youth depends on the research question and scientific discipline. In the context of the transition into the labour market analysed in this project, youth is usually measured by individuals between the ages of 15 and 24 (44). Our country case studies will analyse the appropriateness of this definition for each of the contexts we address (46).

Combining the results of the first two research steps, we can test the hypothesis that improved linkages between actors from the education and employment systems leads to a better youth labour market situation:

Q3: Does improving the linkage between the actors of the education and employment system reduce unemployment, improve gainful employment, job quality, and thus income of the youth?
Using the results of the research project’s first years, we can analyse the impact of changes in the social institutions of TVET on the youth’s labour market situation. We will address this question as well as Q4 in the second phase (year 4-6) of the project.

In order to analyse this question, we need to separate the impact of TVET reforms from other drivers of the youth labour market situation, e.g. labour market regulation, economic growth and/or the self-selection of students into various education programmes (e.g. 47, 48). Furthermore, the impact of TVET might be heterogeneous across subpopulations. Particularly relevant is the question whether women can profit from changes in the TVET systems similarly than men.

**Q4: How can the implementation and continuation of systemic changes in TVET be enhanced?**

Our hypothesis is that focusing reform efforts on the process of reform instead of only on its outcome should enhance the success of a reform of the composition of social institutions of TVET. Since this requires a theoretical and empirical concept of the social institutions of TVET, testing this hypothesis builds upon the results from the first research question Q1. We test this with the following sub-questions:

- **SQ4a:** Which enabling factors and barriers determine the implementation and continuation of a reform project?
- **SQ4b:** How can we measure these enabling factors and barriers in terms of financial and non-financial measures?
- **SQ4c:** What are the criteria for measuring reforms and their implementation processes?
- **SQ4d:** To what extent are foreign actors, such as donor countries, and NGO’s success factors or barriers for systemic changes in TVET?

2. **State of knowledge in the field. How does your research link to national and international development debates and policies**

Our research questions address a number of research strands and policy conversations. In order to test the hypothesis that better aligned social institutions for TVET systems lead to better youth labour market outcomes, we need to define and develop means of measuring and linking both of those concepts generally as well as specifically in low and middle income countries. We further hypothesize that characteristics of the reform process and its implementation affect its success, thereby enlarging the reform implementation literature.

The discussed research questions regarding TVET reform, implementation, and formalization are large parts of the policy debates in all four countries we study (e.g. 49, 50, 51, 52, 53, 54) as well as internationally (e.g. 18, 19). Such reforms have many purposes, ranging from skill development for economic growth to increased access and equity for women and other underserved groups (18). All of the countries we study have recent, ongoing, and planned TVET reforms in the works and the development or formalization of TVET systems is high on their national policy agendas.

The following section discusses the scientific literature to our research project.
Measuring the social institutions of TVET systems

The relevance of linking the actors of the education and employment systems through social institutions is frequently mentioned as an important determinant of TVET’s reform and success, e.g. figuring prominently in UNESCO’s recommendations on TVET (19). In a review of the case studies and policy development on African TVET systems, the authors list conditions for sustainable TVET:

“Evidence from the national case studies reviewed for this synthesis paper shows that public-private multi-stakeholder partnerships involving key players such as government ministries responsible for education and training, enterprises, international donors and development partners, local communities, training providers, professional bodies, NGOs, and the media are capable of generating synergies for the development of employable skills” (18, p.18)

Understanding TVET systems first requires a map of the many actors and social institutions involved in TVET from the education and employment systems, as well as the relationships and linkages among them. From the literature that maps or describes actors in low income countries’ TVET systems, it is clear that those systems are different from the ones in developed countries. While actors from government, formal employers, and employer or industry associations are common in all cases, other actors like non-governmental organization (NGOs), faith-based organizations (FBOs), international donors, and informal employment-sector actors are uniquely important in low income countries (55) and may even supersede the power or effectiveness of the more obvious actors (18). Norms, rules and habits which guide actors’ behaviour are more or less observable. Furthermore, the informal and/or non-formal TVET sectors are especially relevant in low income countries. Informal and non-formal TVET include for example traditional forms of learning in tandems (expert-novices), training provided and recognized by NGOs and FBOs, and on-the-job training (31, 34, 18). These can and do provide the skills workers need to enter the labour market, but such programs can be difficult to find and measure (56, 57, 58).

While the existing literature recognizes the relevance of how actors of TVET are linked and communicate and identifies actors involved in the TVET system, it provides no theoretical framework of the processes and underlying social institutions in which these actors communicate with each other. Similarly, the two studies that aim to measure overall education-employment linkage (59, 60) remain on a highly abstract level without identifying the scope, quality, purpose, and formality of relevant processes in the curriculum value chain and consequently provide little guidance on how policymakers can improve education-employment linkage (e.g. 61). The closest tool available is the KOF EELI (38) that represents a first step to identify the relevant processes in a formal education system of high income countries. Refining this concept and adapting it to the context of low and middle income countries, where non-formal and informal TVET are highly relevant, represents an important contribution of this research project.

Measuring the youth labour market situation

Both quantity and quality of work matter in characterizing the youth labour market situation. In order to develop a conceptual framework for measuring the youth labour market situation, we build upon the KOF YLMI (40) and related literature on comparing youth labour market situations across countries (62, 63, 64, 65, 66, 67). However, while this literature provides important cross-country comparisons as well as initial insights regarding the relevant dimensions of the youth labour market situation, the cross-national perspective limits the depth and precision of indicators due to data availability and
comparability across countries. Furthermore, the relevant dimensions of the youth labour market situation differ substantially between low, middle and high income countries.

The most relevant difference between the three types of countries concerns the prevalence of the informal labour market in low income countries. Cross-country comparisons often measure this by the share of workers who are either self-employed or working in a family business (40). However, self-employment can also serve as an indicator for entrepreneurship (e.g. 68). The entrepreneurial earnings puzzle, referring to the finding that the self-employed earn less on average than wage workers, reflects this ambiguity of self-employment (69). The literature provides three alternative explanations for these findings. The first explanation stresses the non-pecuniary benefits of self-employment, such as being one’s own boss, and explains self-employment by a difference in preferences (70). This explanation appears more relevant in the context of high than of low and middle income countries, though flexibility of self-employment might be more important for women (71). We can use our surveys to address the possibility of preferences driving self-employment decisions in low and middle income countries. For the second explanation, a strand of literature discusses whether self-employment and informal-sector employment arise due to labour market segmentation by either locking individuals out of formal employment or, due to competitive market forces, providing benefits for informal employment. Accordingly, this literature differentiates between opportunity- and necessity-driven self-employment (e.g. 72, 68, 69, 73). Analyses of earnings premiums and penalties for self-employment and informal employees find that formal employment is relatively more valuable in more developed countries (74), suggesting that the importance of labour market segmentation and competitive market forces differ depending on the structure of the labour market. Accurately representing economic activity in a measurement of the youth labour market situation represents a particular challenge that will be addressed in this research project. Third, it could be that the earning puzzle’s wage difference comes from measurement error instead of a true wage gap between the wage worker and self-employed. Comparisons of self-reported survey data with administrative data show a potential downward bias in income data on self-employed workers compared to employed workers (e.g. 70, 75). For low income countries, this issue is aggravated by the fact that administrative data remains largely unavailable due to the significance of the informal sector. Addressing potential measurement error in income data is another challenge to assessing youth labour markets and is part of the reason we turn to collecting our own data through surveys.

These considerations highlight that an appropriate representation of economic activity represents an improvement of indicators for gainful employment, rather than a measure thereof. Conceptually, gainful employment is closely related to decent work, which (76) is defined as “opportunities for women and men to obtain decent and productive work in conditions of freedom, equity, security and dignity”. Capturing gainful employment, therefore, goes beyond measuring income (e.g. 42, 7). While the literature provides a rich source of information (e.g. 77, 78), it remains inconclusive regarding the definition of decent work and their appropriate measurement. Furthermore, most of the literature addresses gainful employment in general and remains silent on the specific characteristics of gainful employment in the context of youth.

In order to understand the effectiveness of labour market alignment strategies, we need to measure skills mismatch. A skills mismatch signals coordination and control problems between the education and employment system. However, measuring skills mismatch can be very challenging (e.g. 37, 79). One approximation consists of education mismatch, referring to an imbalance between formal
education and job requirements. It can be measured by using information in job descriptions, by using information on normal education types for particular job characteristics or by asking workers directly (80). Since education mismatch might miss other types of skills mismatch (e.g. 81), another strategy is to ask individuals regarding the match of their skills to the skills demanded by their jobs (82, 83). However, since each of these methodologies creates measurement error, it remains unclear which methodology should be preferred (37).

**The research project aims to improve existing measurement constructs.** However, due to a lack of resources, low and middle income countries often face the problem of lacking data even for very simple measurement constructs (e.g. 63, 84, 7). Even though labour force surveys and household surveys exist for specific years, analysing developments over time remains a challenge because of the low data frequency. Therefore, the availability of timely data represents a major issue for policy makers, researchers and stakeholders, highlighting the relevance of exploring the possibility to apply the recently suggested technology of mobile phone based surveys (e.g. 85, 86) to gather data on the youth labour market situation.

**Impact of TVET on youth labour market outcomes**

This research project hypothesizes that social institutions of TVET systems have an impact on youth labour market outcomes for graduates. This argument is somewhat taken for granted in the development policy conversation on TVET (e.g. 18, 19), as well as in the theoretical debate regarding dual TVET (e.g. 87, 88, 89) and education-employment linkage more generally (38, 90). However, despite the consensus that social institution in TVET affects outcomes, the hypothesis that education-employment linkage affects labour market outcomes remains largely untested due to two reasons. First, estimating the causal effect of TVET represents a challenging task due to the self-selection of students into an education programme. Second, identifying the impact of the composition of social institutions in TVET requires a comparison of TVET programmes that differ in terms of their social institutions. Hence, the following paragraphs discuss the evidence regarding the impact of TVET and education-employment linkage in TVET on the youth labour market situation.

The most convincing evidence stems from literature that analyses interventions providing TVET compared to no treatment. However, even though some experimental evidence exists in this respect, a meta-analytic summary concludes that “the scarcity of robust evidence on this topic for developing countries indicates the need for improved data and more rigorous methods” (41, p.V). The existing evidence yields surprisingly little evidence of a positive influence of these interventions, particularly for men (41, 91, 48). Since these TVET interventions are costly, interventions that pass a cost-benefit evaluation are even scarcer (48). While this points to the potential of informal TVET, the existing empirical evidence that informal TVET is effective in low income countries (92, 56, 57, 58) fails to pass rigorous scientific evaluation standards. Two related literature strands analyse relatively short spells of non-formal TVET. First, a meta-analytic review, finds that vocational and business training promotes business performance and growth (93). However, these interventions are particularly effective if combined with financial sup-port, stressing the relevance of the economic circumstances in determining the effectiveness of TVET. This is particularly true for women, revealing the often disadvantaged position of women in the informal employment sector. Similarly, a meta-analytic analysis of active labour market policies concludes that classroom and on-the-job training programmes improve employment outcomes in the medium run (94).
This surprising inconclusiveness regarding the impact of TVET on the youth labour market situation might arise for two reasons (e.g. 48). First, returns to TVET might be lower than expected because the economic environment fails to provide opportunities to benefit from the increased human capital. Second, the TVET interventions vary substantially in terms of content, length and organization. Heterogeneity in terms of intervention quality might explain the lack of evidence, highlighting the importance of understanding the social institutions of TVET.

Identifying the impact of social institutions in TVET requires a comparison of TVET programmes that differ in terms of the composition of their social institutions. Due to the scarcity of existing studies, meta-analytic evidence provides no proof of significant differences among various TVET approaches (91). The best evidence regarding Q3 comes from the literature comparing school-based TVET to dual TVET. Since dual TVET combines formal education in school with workplace training, dual TVET has higher education-employment linkage. This literature suggests that dual TVET improves youth labour market outcomes compared to school-based TVET (e.g. 87, 88, 89). However, this literature has three drawbacks in the context of this research project (e.g. 47). First, most of the limited research that does exist in this field is conducted in high income countries (e.g. 95, 96) due to limited data availability in low income countries (e.g. 84). Second, the causal inference remains questionable. Third, the empirical evidence differs in terms of estimated effects (47). This might suggest that heterogeneity of the specific characteristics of dual TVET matter in terms of outcomes. Alternatively, this heterogeneity of effects might arise because of complementary relationship between TVET and country-specificities, e.g. union membership density. Identifying the relevant characteristics of the composition of social institutions in TVET remains an unresolved research endeavour.

Reform implementation
The research project further hypothesizes that aspects of a TVET reform implementation process affect its outcome, so we seek the success factors and barriers to TVET systems reform. Education reform literature cites the need for systems-level reforms and discusses the content of such reforms but not their processes or implementation (97). A review of case studies notes a large divide between planning and implementation and hence conclude that “there is urgent need for extensive research to identify the conditions (social, political, economic) and resources (human, financial, material) that are indispensable to the development of a credible and attractive [TVET] system” (18, p. 22). This citation highlights that while implementation research has become a mature literature in medicine (e.g. 98), it offers little advice to reformers in education. The evidence describing which success factors and barriers affect the implementation and continuation of systemic TVET reform remains weak. Mentioned factors include leadership support, resource availability, project organisation, staff turnover, communication, long-term commitment, clear policy goals, and strong implementation teams (99, 100, 101, 90, 102, 103, 104, 105). Similarly, while the literature on organizational change (e.g. 106) and process innovation management in firms provides an important source of information regarding potential barriers and success factors of reform implementation (e.g. 107, 108), it fails to provide a concise theoretical and empirical framework that defines these factors.

One important reason for this lack of framework is the complexity of the social institutions of TVET. The micro-economic literature provides important insights in this regard, arguing that implementing a systemic change of TVET is a challenge because it requires the coordination of actors in two social
systems. Increasing linkage is particularly challenging if actors from the employment system engage in training students, e.g. in the case of dual VET, because it requires a social institutions setting that aligns the incentives of firms and students (e.g. 47). Firms and self-employers only have an incentive to train if they make a profit during TVET (109, 110) or if labour market rigidities allow them to profit after TVET by paying retained workers less than their productivity (e.g. 111, 112, 113, 114). Students have their own incentives to participate in TVET, which depend on liquidity constraints (e.g. 115), local labour demand, existing pathways within the education system, and the quality assurance of training in firms (e.g. 63). For dual TVET, quality assurance can be formal credentials for training. In informal TVET, quality assurance is socially enforced through families, villages, clans, guilds, or business associations (e.g. 116, 84, 117, 36). Therefore, a strong TVET system needs to be based on a specific composition of social institutions that balances the incentives of students, self-employers, and firms (118, 119). Complementing this micro-economic perspective, the literature on institutional change analyses the conditions that enable stability of systems or facilitate system change (e.g. 120, 121, 122). For example, the literature on varieties of capitalism argues that the presence of complementarities among institutions stabilizes systems, while their absence creates pressure to change the system (122). A prominent example for such a complementarity arises if bank financing enables firms to take a long-term perspective, allowing firms to invest into the human capital of their employees, while firms that need to maximize short-term profits cannot make this investment. The concept of institutional change is particularly suited for our project because it follows an actor-based definition, allowing to identify actors that might act as enablers or barriers for institutional change.

However, while these two strands of literature provide important insights into the incentives of actors on the individual and collective level, they fail to provide a coherent framework to identify success factors and barriers of reform implementation. We draw additionally from the literature on quality management to develop a conceptual and empirical framework of reform management. Both the European Foundation for Quality Management (e.g. 123, 124) and the Malcolm Baldrige National Quality Award (e.g. 125) model represent a useful starting point for a concise framework of enabling factors and barriers of change. While these quality management frameworks are usually used to measure the quality of institutions, we aim to build upon this literature by adapting and applying the framework to the management of institutional change. This approach allows us to exploit the fact that these quality management frameworks have been used in practice, suggesting that detailed examples of operationalisation in the context of educational institutions exist (e.g. 126, 127, 128, 129).

 Own work

The literature review clarifies that the research project requires an interdisciplinary team of experts that combines competences from both academia and TVET management. Dr. Ursula Renold has an academic background in sociology coupled with a dozen years of leadership as a general director of the Federal Office for Professional Education and Technology, managing TVET administration in Switzerland. Particularly relevant ongoing research projects are the development of the KOF Education-Employment Linkage Index (KOF EELI, 38), the KOF Youth Labour Market Index (KOF YLMI, 40) and the KOF Education System Fact books (130, 131, 132). Furthermore, the Center on the Economics and Management of Education and Training Systems (CEMETS, 99) represents an essential ingredient to the implementation of this research project. Prof. Dr. Isabel Günther holds a
Chair in Development Economics at the ETH Zurich, where she leads the Nadel Center for Development and Cooperation. Her research in development economics focuses on the measurement of poverty and gainful employment (e.g. 72, 133, 134). Furthermore, she analyses the effectiveness of development policies (e.g. 135) based on extensive experience in collecting data and implementing randomized control trials (e.g. 136) in low income countries. Dr. Ésaïe Gandonou is a development economist in Benin with a particular interest in the measurement and analysis of poverty (137) and impact evaluations of development projects who has extensive experience in collecting data in Benin (e.g. 138, 139). Education scientist Prof. Dr. Mahesh Nath Parajuli researches the interplay of culture and education (e.g. 140, 141) and has twenty years of experience working for the Nepali Ministry of Education. Similarly, Prof. Dr. Jacqueline García Fallas combines research regarding teacher training and quality of education with twenty years of experience as a researcher in education (e.g. 142). After having coordinated higher education studies in the Chilean Ministry of Education, Dr. Paola Monserrat Bordón Tapia’s research focuses on the economics of education, with a particular focus on modelling education choices of Chilean students (e.g. 143). Hence, this research project has substantial synergies with the ongoing research of each team member. The research team combines expertise in terms of survey implementation with resources in terms of the stakeholder network necessary to implement the research and implementation strategy of this research project.

3. Methodology

In order to analyse the research questions of this project, we apply the developed theoretical framework to create detailed case studies and cross-case analyses (144, 145, 146) in four countries, namely Benin, Nepal, Costa Rica and Chile. This section introduces the four countries and describes the methods for addressing each research question.

Table 1 provides an overview of the four case study countries, revealing that they differ substantially. In particular, they are located across three continents, suggesting that their cultural background differs. Furthermore, the GDP per person in Benin and Nepal is only about one sixth of Costa Rica’s, which in turn lags substantially behind Chile’s. We deliberately choose countries that differ in terms of culture and economic development for three reasons. First, it allows us to test the applicability of our theoretical framework in these different contexts. Second, these differences enable the analysis of functional differences and commonalities, thereby providing a base for mutual learning. Third, challenges faced by the youth and TVET differs between low and middle income countries, as highlighted by the vulnerable employment and youth unemployment rates. The vulnerable employment rate as a proxy for the size of the informal employment sector accounts for nearly 90% of employment in Benin and about 70% in Nepal. It makes up only 20% and 24% in Costa Rica and Chile, suggesting that the informal employment sector plays a relatively minor role in these countries. Conversely, youth unemployment appears to be a minor issue in the low income countries but reaches 19% and 16% in Costa Rica and Chile, respectively. However, these low youth unemployment rates in Benin and Nepal mask the fact that unemployment among educated youth in urban areas represents a substantial economic as well as political and social challenge (4). Enrolment rates in lower secondary, upper secondary and tertiary education suggest that educational attainment remains lowest in Benin, followed by Nepal, Costa Rica and Chile as do the adult literacy rates for the four countries. The shares of formal TVET reveal that formal TVET plays a minor role in secondary education of...
Benin and Nepal, while the shares are substantially higher in tertiary education. In Costa Rica and Chile, about 20% of secondary students are enrolled in TVET. While TVET plays a minor role in tertiary education of Costa Rica, it is very important in Chile.

Table 1: Overview of the case study countries

<table>
<thead>
<tr>
<th>Source of Information</th>
<th>Benin</th>
<th>Nepal</th>
<th>Costa Rica</th>
<th>Chile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population Size (Mio.)</td>
<td>10.9</td>
<td>28.5</td>
<td>4.8</td>
<td>17.9</td>
</tr>
<tr>
<td>GDP per Capita in PPP</td>
<td>2210</td>
<td>2458</td>
<td>15377</td>
<td>22316</td>
</tr>
<tr>
<td>Vulnerable Employment Rate (149150)</td>
<td>87.7</td>
<td>71.6</td>
<td>20.4</td>
<td>24.4</td>
</tr>
<tr>
<td>Youth Unemployment Rate (%) (151)</td>
<td>1.7</td>
<td>4.0</td>
<td>19.2</td>
<td>16.4</td>
</tr>
<tr>
<td>Enrolment Rate Lower Secondary Education (%) (152)</td>
<td>44.3</td>
<td>54.4</td>
<td>76.2</td>
<td>79.4</td>
</tr>
<tr>
<td>Enrolment Rate Upper Secondary Education (%) (153)</td>
<td>16.8</td>
<td>37.0</td>
<td>41.3</td>
<td>82.9</td>
</tr>
<tr>
<td>Enrolment Rate Tertiary Education (%) (154)</td>
<td>15.4</td>
<td>16.9</td>
<td>50.0</td>
<td>83.8</td>
</tr>
<tr>
<td>Adult Literacy Rate (155)</td>
<td>38.4</td>
<td>64.7</td>
<td>97.8</td>
<td>97.3</td>
</tr>
<tr>
<td>Youth Ages 10-24 % of Total Population (5)</td>
<td>32</td>
<td>33</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>TVET Share in Secondary Education (156)</td>
<td>3%</td>
<td>1%</td>
<td>20%</td>
<td>22%</td>
</tr>
<tr>
<td>TVET Share in Tertiary Education (131, 157, 158, 159)</td>
<td>27%</td>
<td>9%</td>
<td>13%</td>
<td>44.8%</td>
</tr>
</tbody>
</table>

8 The fluidity of the concepts of general education and TVET suggests that these represent empirical approximations (e.g. 157, 160, 161).

We use a mixed-method approach in order to analyse the different questions in a holistic manner. The quantitative analysis combines existing micro data sources with our own youth surveys to investigate the youth labour market situation and educational activities. Furthermore, we conduct standardized surveys among TVET experts to assess education-employment linkage in each country and survey reform stakeholders to evaluate reform outcomes. Complementing these quantitative methodologies, we use document analysis and text mining of legal, policy, and media evidence in combination with interviews of reform leaders and TVET experts to gain in-depth knowledge about the detailed composition of social institutions and actors in TVET and analysed reforms.

In order to develop this in-depth knowledge and find reform cases which we can analyse as quasi-experiments and which present opportunities for planned experiments, we will also use two innovative data collection approaches: the CEMETS summer institute at ETH Zurich and the Master of TVET Management in Nepal. Reformers, policymakers and key stakeholders from all four countries will attend the CEMETS summer institute in every year of the project. The institute is both an intervention and a data collection opportunity: for ten days, participants learn about the best practices and economic underpinnings of strong TVET systems while we collect data on their current systems, reform plans, and progress on an annual basis.

The TVET Master is a new programme at Kathmandu University partly funded by this project to help overcome the planning-implementation divide that characterizes systemic TVET reforms in low income countries (18). The TVET Master aims to educate TVET leaders in the administration, NGO’s, industry organizations and TVET schools that possess a systemic view of the TVET sector. It will consist of two tracks. While the first track represents an ordinary university master, the second track provides an educational upgrade to current TVET leaders. Similar to CEMETS, this latter group of students in the TVET master plays a critical role in this research project by providing access to micro-reforms implemented in their TVET institutions.
Moreover, in order to identify reform leaders and key stakeholders, we have already made early contacts with key actors in each country, receiving letters of intent for collaboration from numerous partners. In Benin, “Swiss Contact Benin” and “FODEFCA” have signed a letter of intent. In Nepal, we have received letters of intent by the “Ministry of Education”, the “Council for Technical Education and Vocational Training” and its project “Enhanced Skills for Sustainable and Rewarding Employment” (ENSSURE), which is supported by Helvetas, as well as from the “Federation of Nepalese Chambers of Commerce and Industry”, its “Agro Entreprise Center” at Kathmandu, from the “Training Institute for Technical Instruction (TITI)” and the NGO “Underprivileged Children’s Educational Programs”. In Costa Rica, we have secured a letter of intent of the “Universitat Invenio”. In Chile, the NGO “Fundación Chile” has signed a letter of intent.

Social Institutions of TVET

We use a mixed-method design to apply the conceptual framework of TVET’s social institutions to the case study countries. We triangulate information from document analysis and expert interviews to develop a description of the TVET system in each country using qualitative content analysis (162, 163). Building on this overview, we modify the KOF EELI survey so that it fits to the context of low and middle income countries, including non-formal and informal TVET. We conduct the developed standardized survey among TVET experts and reform leaders to analyse the current social institutions of TVET. The actor mapping process will rely heavily on the networks and resources of researchers in each country to complement documents and international data sources on all four TVET systems. In Nepal, we also draw on the students in the TVET Master programme some of who will come from inside existing TVET institutions with extremely useful perspectives on who is involved and how.

Youth labour market situation

We measure the youth labour market situation by quantitative analysis. Adapting the KOF YLMI (40) to low and middle income countries based on the existing literature on measuring the youth labour market situation (e.g. 64, 65), we develop a set of indicators that capture the youth labour market situation in terms of access to employment, job quality, gainful employment and income earned.

The first step to apply this measurement tool to the case studies consists of evaluating the presence of existing micro data, particularly in the form of Labour Force Surveys, Household Surveys (164) and School-to-Work Transition Surveys (65) that have been adapted to the needs of low and middle income countries. However, existing micro data remains insufficient for this research project, because the surveyed information lacks in terms of detail, in particular for the youth, and often only exists in low frequency. Furthermore, analysing the impact of policy reforms creates substantial data requirements in terms of frequency, information about particular subpopulations, e.g. regions or occupations, and sample sizes for each subpopulation.

Since existing micro data remains insufficient to satisfy the needs of this research project, we complement existing micro data sources with our own standardised youth surveys. The survey’s first part assesses the youth labour market situation on dimensions like unemployment (165) and job quality. The second part of the survey captures the education process characteristics of formal, non-formal and informal education activities (35, 166) using indicators like credentials, duration, and the shares of school education and workplace training.
These youth surveys primarily focus on surveying a representative sample of youth living in urban areas. There are three major reasons for this. First, existing TVET activities are primarily focused in urban areas (167). Second, in low and middle income countries, youth unemployment is concentrated in urban areas (4). Third, focusing on urban areas allows us to evaluate the possibility of using mobile phone technologies to conduct surveys among youth. In doing so, we aim to contribute to the development of a cost-effective survey methodology that helps implement surveys on a regular basis, establishing the data necessary to make evidence-based policy decisions. The technology developed can be used by policymakers to gather data after the end of the research project as well.

Impact of social institutions setting of TVET on youth labour market outcomes

We rely on the combination of results from the first two questions’ research and the strong relationships with reform leaders and stakeholders in all four countries to analyse the impact of the social institutions setting of TVET on youth labour market outcomes. Because TVET reform leaders from all four countries will be attending the CEMETS summer institute every year of the project, we will be able to follow their planning and progress in reform implementation. Similarly, students of the TVET Master in Nepal who are leading TVET institutions might implement micro-reforms in their institutions. Benin and other countries may also send students to the TVET Master program, which increases the scope of analysing such post-graduation micro-reforms even further. Ordinarily these reforms would be difficult to study for international researchers, but our access to these students will enable us to study bottom-up locally originating reforms that can demonstrate how low income countries can find the right TVET system for their own contexts without relying on international intervention. The continuous cooperation with reform leaders provides an ideal setup to analyse reforms that would be very difficult to analyse otherwise in a coherent approach with a systemic view.

In the ideal situation—and one that is likely given the structure of this project—we will be able to help them design a randomized controlled trial (RCT) as part of their reforms. Such RCTs are even more likely for the micro-reforms enacted by graduates of the TVET Master in Nepal. This would give us the chance to test the causal impact of education-employment linkage on youth labour market situation measured by our youth surveys, which not only serve to evaluate the youth labour market situation, but are instrumental in analysing Q3.

In the scenario where an RCT is not possible in any or all of the four countries, we will still be able to follow the reforms and exploit them as natural quasi-experiments. The in-depth-knowledge of the reforms provides us with information regarding the changes in the institutional structure of TVET and further enables us to create comparable control groups. Using this in-depth knowledge allows us to implement so-called reform youth surveys before and after the reform implementation among a treatment and a comparable control group. Then, we would aim to apply regression discontinuity designs or difference-in-difference estimates to identify the impact of the reform.

Complementing these two identification strategies based on the reforms accessed in the context of CEMETS and the TVET Master in Nepal, the third strategy consists of analysing current TVET reforms in the case study countries. The following paragraphs describe examples of ongoing reforms, which provide information regarding important developments to be considered for CEMETS. In 2006, employer associations of several occupations in Benin began cooperating with the government to introduce tests in
the end of informal dual VET programmes, providing the youth with a certificate (49, 161). Furthermore, education centres provide general education, such as courses in French, to these students. The changes happened at different times depending on the occupation and location of the education centres, providing the potential to analyse this interesting example of a formalization strategy with a difference-in-difference estimation. In Nepal, the government is starting a pilot project of non-formal apprenticeships (168, 169). As these are implemented over the course of the six years involved in the project, we will be able to exploit variation over time to explore the impact of another formalization strategy’s impact on the youth labour market situation. Furthermore, supported by the SDC (170), Nepal is expanding the National Vocational Qualifications Framework (NVQF), which aims to provide a system for the recognition of skills gained in informal and non-formal settings (e.g.171,172). In Costa Rica, the “Instituto Nacional de Aprendizaje”9 provides dual TVET for students from poor backgrounds (173). Due to its high quality and limited number of spaces, this programme is oversubscribed, which provides us with the opportunity to analyse its impact on the youth labour market situation. Furthermore, the University Invenio10 has started to implement a study program that provides dual TVET to students after upper secondary education in 2013. Finally, Chile is planning to establish 15 new TVET colleges (174). Due to the decentralized nature of the Chilean education system, these colleges and the education programmes within them will differ in terms of linkage and time of execution, thereby providing us an opportunity to analyse the impact of linkage on the youth labour market situation in a difference-in-difference setting.

Reform implementation

Participation of reform leaders in the CEMETS summer institute and the TVET master in Nepal is invaluable for our investigation of success factors and barriers to reform implementation. In order to perform our analysis, we need in-depth knowledge on the reform process and participating actors, along with their roles in reform initiation, application and feedback mechanisms. The continuous contact with reform leaders allows us to complement analysis of official documents by conducting interviews and by accessing informal information and documents for analysis. Furthermore, a standardized stakeholder survey among key stakeholders like students, teachers and firms assesses their satisfaction during the reform process. The TVET Master is itself a reform and is therefore a case study in the implementation research strand.

4. Timeframe and milestones

This is a six-year project divided into two three-year phases. Figure 4a summarizes the timeline of research activities and corresponding milestones for each of the four research questions. The blue and brown part highlight the first and second project phases, respectively. Research on Q1 starts by developing a conceptual framework of the composition of social institutions in formal, non-formal and informal TVET. Based on the insights of a document analysis and qualitative expert surveys, we conduct a structured education-employment linkage survey in 2018, resulting in an analysis of the composition of social institutions in TVET in the end of the first project phase. In the second project phase, repeating the education-employment linkage survey and expert interviews combined with ongoing document analysis yields information regarding changes in the composition of social institutions of TVET. Project area Q2 begins by developing a conceptual framework of the youth labour market situation. Combining information from two youth surveys in 2018 and 2021 with the ongoing
processing of existing micro-data yields an analysis of the youth labour market situation and its changes. Therefore, Q1 and Q2 are the foci of the first project phase.

Preparatory work for Q3 analysing the impact of education-employment linkage on youth labour market situation starts early in the project by the engagement of policymakers through CEMETS, the TVET Master in Nepal and complementary document analysis. These preparations build the ground for gathering the data necessary to analyse reform effects at the appropriate time and among the appropriate sample by conducting reform-specific youth surveys in the cohorts before and after the reform of a treated and an untreated youth group. Combining these surveys with information from existing micro data allows to analyse the impact of education-employment linkage on the youth labour market situation. Similarly, preparation for Q4 starts in the beginning of the project by interviewing reform leaders, conducting document analysis and surveying reform stakeholders during and after the reform process. These preparations in the first project phase, in terms of both conducted research and preparation of data gathering, lay the ground work for Q3 and Q4 in the second phase. The brunt of the Q3 and Q4 research takes place in the second project phase in the form of developing a conceptual framework and a case study analysis of barriers and success factors of reform implementation.

Figure 4a: Timeline of Research Activities and Project Milestones

| Milestone 1: | Conceptual framework of the composition of social institutions in formal, non-formal informal TVET |
| Milestone 2: | Case study analysis of composition of social institutions in the TVET system |
| Milestone 3: | Case study analysis of changes of composition of social institutions in the TVET system |
| Milestone 4: | Conceptual framework of youth labour market situation measurement |
| Milestone 5: | Mobile-phone based youth survey technology |
| Milestone 6: | Case study analysis of youth labour market situation |
| Milestone 7: | Case study analysis of changes in the youth labour market situation |
Milestone 8: Analysis of the impact of composition of social institutions in the TVET system on youth labour market situation

Milestone 9: Conceptual framework of barriers and success factors of TVET reform implementation

Milestone 10: Case study analysis of barriers and success factors of TVET reform implementation

Figure 4b displays the timeline of transfer activities, which are used to transfer knowledge and insights from one person or party to another. The most important transfer activity consists of engaging with reform leaders and relevant stakeholders in each country in the context of CEMETS, which takes place every summer. In addition, we present the results from the project to the stakeholders in conferences taking place in Switzerland, Nepal and Benin at the end of the first and second project phases, respectively. Beyond transmitting research results to the stakeholders, these conferences aim to improve the connectedness among stakeholders. The introduction of the TVET Management Master in Nepal will be an important transfer activity. It serves as a pilot project for effectively transmitting the research insights gained in the course of this project and builds capacity in TVET system design and management. The planning period of the TVET Management Master starts in the beginning of the project and culminates in the implementation of the study programme in autumn 2018. The lower part of Figure 4b illustrates that PhD students involved in each project phase meet for the first time at the very beginning of their studies and that meeting in the context of PhD courses in Switzerland and Nepal serve to deepen these personal relationships further.

Figure 4b: Timeline of Transfer Activities

5. Organisation of research groups

Analysing the research questions addressed in this project requires an interdisciplinary approach. This project combines knowledge and competencies from sociology, education, economics of education, and development economics. In addition, the cross-country perspective of the research project requires scholars from each country to provide inputs regarding their local education and employment systems. Therefore, the project organisation needs to ensure coordination across research groups from different scientific fields and countries.

In order to ensure this, we organize the research project in a matrix organization as depicted in the left part of Figure 5. The horizontal dimension shows the research question and the vertical dimension
represents the six research groups. Dark blue cells indicate core questions, suggesting that the research group leads the development of the conceptual approach in addition to the empirical analysis. Medium blue cells indicate that the research group focuses on analysing the research question empirically in the country-specific context and participates in the development of the conceptual approach by ensuring the fit to the country-specific context. Light blue cells indicate that a research group mainly collaborates in the context of comparative analysis across countries and provides expert knowledge regarding the local education and employment system. Additionally, each research group participates in the analysis of each research question by ensuring that conceptual frameworks and survey translations are accurate and applicable to the local context. This ensures that country-specific questions can be included in the survey, allowing research groups to analyse country-specific questions. Furthermore, each research group has the option to participate in comparative studies that include the country represented by that research group. In order to ensure cross-fertilization of ideas, we will establish a tool such as Dropbox to share all collected data.

Two research groups come from Switzerland. TVET expert Dr. Ursula Renold from the Education Systems Division of the KOF Swiss Economic Institute at ETH Zurich leads the KOF research group, supported by her Post-docs, Dr. Thomas Bolli, Dr. Catherine Caves and a newly hired person working 50% for the project management. The KOF research group focuses on analysing Q1, Q3 and Q4. Also at ETH Zurich, development economist Prof. Dr. Isabel Günther from NADEL at the GESS and senior scientist Dr. Rudolf Batliner focus on Q2 and participate in the analysis of Q3. Two other research groups come from the Group 1 countries of Nepal and Benin. Education scientist Prof. Dr. Mahesh Nath Parajuli in Nepal focuses on Q1, supported by assistant professor Prakash Bhattarai. Economist Prof. Dr. Ésaïe Gandonou in the Republic of Benin focuses on Q2, supported by Dr. Sylvain Kpênavoun. The two re-search groups in Nepal and Benin collaborate intensely regarding Q1 and Q2 in the context of low in-come countries and analyse Q3 and Q4 in their respective countries. The last two research groups come from the Group 2 countries of Costa Rica and Chile. Education scientist Prof. Dr. Jacqueline García Fallas in Costa Rica focuses on Q1, supported by the director of the Economics Research Institute, Prof. Dr. Max Soto Jiménez. Economist Dr. Paola Monserrat Bordón Tapia in Chile focuses on Q2. The re-search groups in Costa Rica and Chile cooperate intensely in the analysis of Q1 and Q2 in the context of middle income economies and analyze Q3 and Q4 in their home countries.

The cross-country perspective of this research project further suggests that research groups need to collaborate not only in terms of research projects, but also in terms of other activities, namely the organization of the CEMETS summer institutes, the implementation of country-specific surveys, the organization of communication and events, the management of the TVET stakeholder network and the implementation of the TVET Management Master in Nepal. In order to ensure the collaboration of re-search groups, the right part of Figure 5 visualizes the organisation of other activities. The distribution of other activities also follows a matrix design across project areas on the horizontal axis and research groups on the vertical axis. Dark blue cells indicate that a project area represents the main responsibility of a steering committee member. Medium blue cells represent country-specific responsibilities, while light blue indicates that the research group is only peripherally involved in the project area. In order to facilitate coordination among the six steering committee members, each member of the steering committee takes responsibility for coordinating activities in one project area. Ursula Renold takes responsibility for CEMETS besides her overall responsibility in leading the research project. Isabel Günther coordinates the research activities of
the PhDs in the steering committee. Furthermore, each research group manages the country-specific implementation of surveys, the country-specific contact with experts, development agencies, and governments and the country-specific communication and events. The responsibility of the coordination for survey implementation lies with Ésaïe Gandonou for survey implementation, for coordination of communication and events Jacqueline García Fallas and for the management of the TVET stakeholder network with Paola Monserrat Bordón Tapia. Mahesh Nath Parajuli manages the implementation of the TVET master, supported by Ésaïe Gandonou.

Figure 5: Project Organisation Chart

However, while clarifying roles and responsibilities represents a first step, collaboration of research and transfer activities further require extensive communication. The steering committee already met during the preparatory workshop for developing this full proposal. At that meeting, all members clarified their expectations and roles, and developed the joint research agenda. Regular meetings of the steering committee via Skype in combination with annual personal meetings in the CEMETS summer institutes will deepen these personal relationships and ensure the continuous exchange of ideas, research questions, research projects and dissertation topics. Furthermore, the whole team including all researchers and students, will meet for a workshop in the middle of the first and second project phases, as well as at the end of the third year (halfway point) to set the next wave of goals and PhD projects based on progress and any changes.

As shown in Figure 4b, the first stage of the research project entails a dissertation in Benin, Nepal, Chile and at the KOF and GESS in Switzerland in addition to a researcher in Costa Rica. The second project phase entails a dissertation in Benin, Nepal, Costa Rica and at the KOF in Switzerland in addition to a researcher in Costa Rica. These students meet in the beginning of the study period to enable personal
contact, prepare the ground for cooperation across distance over the course of the project, and ensure that all participants understand the various parts of the research project. PhD students are also invited to attend the CEMETS’ PhD course program\footnote{http://www.cemets.ethz.ch/education/seminars.html} and the TVET master in Nepal to intensify the cooperation across countries and to provide solid methods training. Co-supervision of PhD students by multiple members of the steering committee also serves to ensure interdisciplinary and communication across re-search groups.

Furthermore, we establish specific PhD student requirements and responsibilities. All PhD students must speak/read/write English fluently to enable communication. All research done by funded PhD students must be related to the project and its research questions. Each PhD student has one focus question and further works on their countries’ case studies, national studies, and contributes to the international comparisons. One post-doc will be responsible for coordination and communication among all PhD students.

6. **Pathways to impact**

Pathways to impact are strongly embedded in the design of this project. The CEMETS summer institutes are part of the data collection methodology, as is the TVET Master program. Both contribute heavily to the transfer of knowledge from project team members to policymakers, programme leaders, and key stakeholders in all four countries, including Swiss government agencies and NGO’s engaged in TVET. In addition, we plan stakeholder conferences at the end of each phase in Switzerland, Benin and Nepal. Finally, the fourth question of the research project specifically addresses the transition from policymaking to implementation. Answering Q4 involves searching for success factors and barriers to successfully changing the behaviours, knowledge, and institutions of low and middle income countries in order to improve youth labour market outcomes. This section details the logic model (described below) of our pathway to impact, the knowledge transfer processes we employ, and how these can facilitate real change.

Our logic model of how the project will affect change is simple: sustainable reforms follow a cycle of reform development, application, outcome, and feedback/updating phases. The knowledge-transfer elements of this project interact with the reform development, application, and feedback/updating phases, thus modifying their impacts on outcomes. The research results feed into each of those knowledge-transfer elements, reiteratively improving their efficacy and relevance. This model is summarized in Figure 6. The pink-coloured boxes represent knowledge transfer activities. Stakeholder conferences are scheduled for the end of both phases of the research project, and are opportunities for us to share our findings with stakeholders like policymakers and leaders from employment and education in all countries. The information flowing into these conferences will primarily be results from Q1, Q2, and Q3, which address measuring youth labour market outcomes, education-employment linkage and the impact of education-employment linkage on youth labour market outcomes. These benchmarks provide valuable
feedback for stakeholders that they can use when they revise their policies for improving TVET. Research results from other parts of the project will also be shared with the stakeholders, including our work on implementation. Therefore, stakeholder conferences primarily affect the feedback/updating phase of the reform cycle, which is then applied to the other phases to affect youth market situation of future TVET students.

The CEMETS’ summer institutes are held annually throughout the project and include reform leaders and key stakeholders from all four countries. At these institutes, we will intervene directly in the reform development phase by working with reform teams to critically reflect their plans and make according adjustments and refinements led by a problem-based learning approach. Much of this information will be drawn from the implementation research part of the project, which directly addresses what they will need to know to go from creating new programmes or policies to seeing their application. We also include knowledge from the other parts of the project, which helps reformers understand the specific strengths and weaknesses of their own contexts. By influencing reform development, this approach not only improves the youth labour market situation of youth involved in the immediately affected pilot projects, but also affects future generations of youth by improving the social institutions of TVET.

Figure 6: Logic model for pathways to impact

Finally, the TVET Master in Nepal draws on all parts of the research project to affect both the development and application phases of the reform cycle. Students from Nepal, Benin, and potentially other low income countries will enter the programme. They will re-enter their roles as policymakers or programme leaders with this new knowledge, where they will act on the development or application phases, respectively. This also creates the exciting opportunity for the pilot programme to serve as a model for other countries in their efforts to build capacity in their TVET systems by establishing similar programs. When
countries have their own TVET specialists performing local research and viewing new policies from a systemic perspective, they can develop TVET systems that fit the local context, conform to quality management standards and serve youth even more effectively. The one element of this project’s knowledge transfer programme in terms of capacity building that is not depicted in Figure 6 is the PhD students who will be funded by the project. Their effects will be widespread throughout the reform cycle, depending on their choices and specific areas of expertise. The PhD students educated through this project will be experts on TVET in their own local contexts and in the frame of global best practices and knowledge in the field. Their expertise enables them to become the next generation of TVET leaders and researchers, joining the TVET Master graduates as agents of sustainability and local control over skills development.

A critical part of the pathway to impact is understanding what the success factors and barriers to change might be. Especially in low income countries where reforms of TVET on a system level are often planned but rarely enacted (18), these must be identified for such a project to be completed. We incorporate this into our overall research question and address it specifically in Q4, which deals with implementation. Strategies and planning does not affect outcomes without implementation, so we dedicate research energy to understanding what enables or spoils the efforts of reformers to improve their TVET systems and thus the labour market situation of the youth.

An important aspect consists of identifying stakeholders who might resist change, i.e. identifying potential losers of a reform. Hence, it is important to use the extensive period of time necessary for systemic changes in the education and employment system to organize a buy-in of potential losers by adapting their career-perspectives. These losing stakeholders differ in formalization and labour market alignment strategies. For formalization strategies, the main potential losers might consist of the education providers from the employment system. For example, master-novice relationships might become un-profitable for the masters because students spend more time in the classroom. Section 2 discusses the incentives of these stakeholders, revealing that formalization strategies need to carefully consider how to avoid destroying these incentives. For labour market alignment strategies, schools and their teachers represent an important stakeholder group that might resist change due to a fear of losing resources and control over the education process. In addition, labour market alignment strategies aim to involve the actors of the employment sector. However, since this requires these actors to devote substantial resources to improve education-employment linkage, the reform strategy needs to ensure that these actors do have an incentive to make this investment.

7. Strategy for Communication and Application

The application and communication strategy of this project relies on stakeholder conferences, CEMETS summer institutes, and the TVET Master programme to communicate directly with stakeholders. The stakeholder conferences present results and engage stakeholders in the project with the goal of translating our findings into effective policies and those policies into effective practice. The CEMETS summer institutes focus on critically reflecting the content and implementation plan of reforms in all four countries, making their primary contributions ongoing interaction with stakeholders, intervention optimisation, and policy change that reflects the knowledge and best practices in the field. The project communicates with
practitioners and policymakers in the TVET systems of Nepal, Benin, and other low income countries through the TVET Master to bring knowledge from this study and team of researchers to bear on their policymaking, interventions, and practices.

**Engaging stakeholders for application**

Stakeholder conferences are a chance for the research team to present results, but also for us to engage with key TVET leaders and interact with them. The conferences will include presentations of research findings that are aimed towards policymaking and effective practice, as well as workshops to help stakeholders implement new ideas and utilize the tools we develop through the project. These conferences will also serve as gathering points that bring together diverse stakeholders and help them communicate in a common language about the issues and opportunities of their own TVET systems, as well as the way forward.

At the CEMETS summer institutes, reform teams and key stakeholders from each of the four countries will come to Zurich every year of the project to join TVET reformers from all over the world. They will all learn the best practices and leading edge of underlying economic principles of TVET systems from global leaders in TVET scholarship and practice. This includes constantly updated findings from the entire re-search project with a special emphasis on implementation. Every reform team presents their planned project and implementation strategy, meanwhile hearing feedback from the other teams and participating in the discussion of all projects. Participants work with CEMETS experts to refine their plans and further develop their strategies. In two previous summer institutes, participants noted the experience as being supremely useful for their projects, and programme alumni are already implementing radically innovative reforms that have begun to scale up to the state and national levels.

Students in the TVET Master programme will come from the TVET systems of Nepal, Benin, and other countries. They will have experience as policymakers, training providers, or school leaders but lack the expertise to manage TVET as a system. These students will learn about TVET policies and practices at the national and institutional levels, and do research projects that investigate issues of local relevance. They will graduate and return to the TVET system as policymakers or practitioners, able to understand and develop the system. Their micro-reforms, implementation of policies into practice, and systems-perspective in leadership will enable their local TVET systems to improve. This perspective will enable the countries who send students to the TVET Master to develop TVET systems that fit their own contexts and optimize to local labour market, social, educational, and environmental needs instead of relying on external intervention.

**Further communication**

The research and dissertations generated during this project will be disseminated through academic and media channels. Because the overarching and subordinate questions of this project are relevant for theory as well as practice, their answers will be shared with both scholarly and practical audiences. CEMETS shares its findings with each new batch of practitioner participants, as well as through its web-site at www.cemets.ethz.ch. CEMETS is also active on social media and can use those accounts to
publicise information. Researchers have networks in their own countries they can use to connect interested parties to information. The researchers leading this project have histories of publishing in national and international journals and newspapers about their findings, and will continue to do so.

**Scalability**

We directly address scalability and sustainability in the question on success factors and barriers to implementation progress. Scalability is further addressed through the TVET Master and development of new measurement tools for youth labour markets and education-employment linkage. The implementation research strand pertains to how we can translate knowledge and intentions into active programmes, and how those programmes can grow to become system-level changes.

The TVET Master is a tool for sustainability within Kathmandu University and as a model for future programmes. Capacity-building is a common issue in reform implementation, and a significant component of that is the development of the people who can help run the system. Managing a TVET system requires top-down leadership from policymakers and government actors, but it also requires individuals within the system at multiple levels (60) who can guide their domains with a systems perspective. Graduates from the TVET Master in Nepal can help their own systems develop and build capacity. In addition, the programme itself is a model for similar programmes in other countries. When other countries’ reformers see the value of sending students to Kathmandu University, they are likely to want programmes of their own.

Finally, the tools we will develop for measuring the youth labour market situation and the level of education-employment linkage can become part of the statistical toolbox of the countries we study and others. In some of the countries where this project takes place, there are currently no reliable tools like labour force surveys that policymakers can use to assess the situation of young people on the labour market. Furthermore, governments find it difficult to measure or track the quality or progress of the social institutions in TVET because there is no tool except the very new KOF EELI that can measure education-employment linkage. Especially since we will be tracking progress with these measures over the period of this study, the focus countries are likely to find these tools useful for measuring continued progress after the study is done.

Researchers need to find out how the composition of the social institutions of TVET relate to youth labour market outcomes, especially income. However, that is only part of this project. We also look into the barriers and success factors to countries’ efforts to move from one composition of social institutions to another in an effort to improve such outcomes. We engage with stakeholders, advise and observe policy implementation and reforms, and develop programmes and tools countries can use to develop and measure their TVET systems and youth labour market outcomes.
# 8. Result Framework

<table>
<thead>
<tr>
<th>Hierarchy of objectives</th>
<th>Key indicators</th>
<th>Data sources</th>
<th>Assumptions and risks (external factors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact (Overarching goal)</td>
<td>Impact indicators</td>
<td>Means of verification</td>
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<tr>
<td>Increased decent employment of the youth in low- and middle income countries through TVET reforms that better link education supply and labour demand.</td>
<td>Youth unemployment rates Income data KOF youth labour market index Number and quality of TVET reforms, in particular in case study countries</td>
<td>National statistics Youth survey on labour market outcomes in case study countries Surveys of stakeholders and reformers in case study countries</td>
<td>Missing linkages between education and labour markets are a driving force of high underemployment among young people in low- and middle income countries. Political willingness in developing countries for TVET reform exists. Results from the research translates into TVET reforms</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td><strong>Outcome indicators</strong></td>
<td><strong>Research results</strong></td>
<td><strong>Data from all domains is available for research. Stakeholders collaborate for pilots of TVET reforms.</strong></td>
</tr>
<tr>
<td>Outcome 1: The impact of linking the actors of education and labour market is better understood, especially in terms of decent employment and job for the youth.</td>
<td>Theoretical and empirical frameworks developed Publications linked to research (experiments) between education-employment linkage and youth labour market outcomes</td>
<td>Research results Journal publication Survey on education-employment linkage for the institutional conditions of TVET in case study countries Youth survey on labour market outcomes in case study countries Randomized controlled trial performed in case study country/Natural experiments (existing and future reforms)</td>
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<td>Outcome 2: Enabling factors and barriers to move towards TVET reforms are identified and used to foster TVET reforms, in countries.</td>
<td>Patterns of successful change conditions Actual planning and progress in reform implementation</td>
<td>Research results Journal publication Interview data collected during CEMETS summer institutes</td>
<td>Research findings can be translated into effective policies and those policies into effective practices Research findings receive interest from countries looking for improved TVET systems High participation in CEMETS schools.</td>
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<td>Outcome 3: Experts are formed to lead reforms across low and middle income countries, representing agents of sustainability and local control over TVET development.</td>
<td>Master’s students (TVET Management) successfully graduate PhD dissertations are published Master’s students and PhD entering TVET domain as professionals Projects in TVET domain conducted by former Master’s students Reforms in TVET domain conducted by former CEMET participants</td>
<td>Master’s degree awarded Career-tracking mechanism PhD certificates Evaluations of CEMETS summer institutes</td>
<td>Satisfactory performance of Master’s students in the program Acceptance of PhD dissertations by respective universities Appropriate profile of Master’s students and PhD to obtain TVET positions Students get public positions in emerging and developing countries (not attributed on merit) CEMET participants can initiate TVET reforms</td>
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<tr>
<td>Outputs (per outcome)</td>
<td>Output indicators</td>
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<tr>
<td><strong>For outcome 1:</strong> The impact of linking the actors from education and labour market is better understood, especially in terms of decent employment and job quality for the youth.</td>
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<tr>
<td>Output 1: A measure of social institutions in TVET systems is developed.</td>
<td>Theoretical and empirical frameworks developed Map of actors involved in TVET from the education and employment systems, as well as social institutions determining the linkages among them Social systems theory Neo-institutional theory KOF Education-Employment Linkage Index (KOF EELI) Triangulation of information from document analysis and semi-standardised expert interviews conducted during the CEMETS summer institute Data from international organisations and national institutes Networks and resources of researchers in each case study country Conceptual framework of the institutional conditions in the TVET system can be built on the KOF EELI Differences in institutional settings between formal and informal TVET are identified Formalization and integration of informal TVET into the formal education system are understood Data from each case study country is available Results from case studies can be compared to each other Measurement in the domain of informal/non-formal training Complexity of relationships among actors in developing countries Implementation constraints regarding the youth survey Complexity in measuring skills mismatch (measurement error) Disparities in data collected, making difficult comparisons between countries. Information regarding ongoing reform to TVET in the participating countries as well as recently-completed or abandoned efforts are available and can be linked to micro-data (existing or collected by the research project).</td>
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<td>Output 2: A measure of the youth labour market situation in low- and middle income countries is developed.</td>
<td>Measure of gainful employment and job quality in low income countries Measure of skills mismatch in middle income countries KOF Youth Labour Market Index (KOF YLMI) Existing micro data sources (LFS, SWTS) Youth survey on labour market outcomes in case study countries</td>
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<td>Output 3: Pilots to test the impact of TVET reforms, improving the linkage between the education and labour market are implemented.</td>
<td>Reports and journal publications Document analysis of legal, policy, and media evidence related to ongoing and planned TVET reforms Micro-data collected for case countries.</td>
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<td><strong>For outcome 2:</strong> Enabling factors and barriers to move towards TVET reforms are identified and used to foster TVET reforms, in particular in the case study countries.</td>
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<tr>
<td>Output 1: Enabling factors and barriers that determine the implementation and continuation of a reform project are identified.</td>
<td>Reports and journal publications Interview data collected during CEMETS summer institutes</td>
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<tr>
<td>Output 2: Reforms are initiated in case countries.</td>
<td>Past and ongoing TVET reforms in case study countries Document analysis of legal, policy, and media evidence related to ongoing and planned TVET reforms Case study analysis</td>
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<tr>
<td><strong>For outcome 3:</strong> Experts are formed to lead reforms across emerging and developing countries, representing agents of sustainability and local control over TVET development.</td>
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<tr>
<td>Output 1: CEMETS summer institute</td>
<td>One annual meeting organized each year at ETH in Zürich Record of organized annual meeting Record of presentations at seminars or conferences Stakeholders are motivated to participate and to actively contribute to the meeting Lack of interaction between participants from different countries and backgrounds.</td>
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<td>Output 2: Master of TVET Management in Nepal</td>
<td>Number and proportion of graduating Master’s students Record from Kathmandu University The programme is taught according to guidelines Students are motivated to graduate</td>
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<tr>
<td>Output 3: Educated PhDs understand the complexity of TVET systems.</td>
<td>PhD dissertations published PhD certificates Acceptance of PhD dissertations by respective university Good interaction between PhD candidates.</td>
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